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(56) References cited:
EP-A- 0 139 295
DE-A- 3 016 212
GB-A- 2 155 596
US-A- 3 355 962
US-A- 4 593 577
US-A- 4 762 015
US-A- 4 762 015

- **PATENT ABSTRACTS OF JAPAN vol. 001, no. 154 (M-051)9 December 1977**

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EP 0 497 262 B1

Description

BACKGROUND OF THE INVENTION

The present invention relates to a steering column assembly for a vehicle such as a motor vehicle. Especially, the present invention relates to a tilt steering column assembly including a tilt lock mechanism, a tilt spring and a mounting bracket usable for fixing the column assembly to a vehicle body.

The steering column assembly, in general, extends obliquely and upwardly from a steering gear, and has a steering wheel at the top. The tilt steering column assembly permits a driver to move the steering wheel up and down to a desired angular position. The tiltable steering column can improve the safety of a vehicle by providing ergonomic driving comfort. In some models, the tilt spring is arranged to cause the steering wheel to leap up from a preset position to an uppermost position immediately after release of the tilt lock so that a wider space is available for the driver to get on or off the car.

In large sized vehicles such as heavy trucks, a tilt hinge is often placed near the driver's foot position. In passenger cars, however, the tilt hinge is usually placed at a higher level near the driver's hands to leave a comfortable space for the legs and knees of the driver.

There have been proposed various tilt lock (or latch) mechanisms. In one example, a lock device is provided only on one side of a movable bracket (Japanese Utility Model Examined Publication No. 57-53730). Another example is a two-sided type having two locks on left and right sides (Japanese Utility Model Provisional Publication No. 1-123969). This type is advantageous for improving the rigidity of the structure and installing an air bag system. A third example is a center lock type (Japanese Utility Model Examined Publication No. 2-34145) in which the lock mechanism is placed under the steering column near the tilt hinge axis.

The two sided type tilt lock mechanism is complicated in construction, heavy in weight, and unfavorable in manufacturing cost, however. Besides, it is necessary to maintain the correct positional relationship and synchronism between the left and right sides to avoid incomplete engagement. The conventional center lock type mechanism uses engagement between gear teeth formed in a convex cylindrical surface of a swingable gear member and teeth formed on a concave surface of a fixed gear member. In this center lock mechanism, however, the gear members must be positioned accurately relative to each other to ensure reliable engagement.

Still another examples are shown in United States Patent 3,355,962; Japanese Patent Provisional Publications Nos. 2-92779, and 1-83455, and Utility Model Provisional Publications Nos. 57-53730 and 56-16581.

GB-A-2155596 describes a tiltable steering mechanism comprising upper and lower steering columns which are connected with each other so that the upper column is swingable about a tilting axis. Furthermore, there is provided a tilt lock mechanism for locking the upper column in a desired tilting angle. The tilt lock mechanism comprises a fixed gear portion being fixedly attached to the upper or the lower column, respectively. The other column supports a movable gear member which is engagable with the fixed gear portion in order to lock the tilt lock mechanism. The fixed gear portion is provided with a toothed portion, the teeth being arranged on a circle concentric to the tilting axis. The movable gear member is provided with a toothed portion of an archlike shape so as to fit with the toothed portion of the fixed gear portion. In order to unlock or to lock the tilt lock mechanism, the movable gear member can be swiveled about an axis. It is a drawback of this steering mechanism that the fixed gear portion has to be provided close to the tilting axis of the steering columns. This results in a remarkable space needed for the lock mechanism. Furthermore, the concentric arrangement of the toothed portion of the gear portion is limited with regard to the maximum diameter possible. Therefore, the number of teeth engagable with the movable gear member, is strictly limited. This results in relatively high forces enhancing the danger of destruction of the lock mechanism. A further drawback is given with regard to the end positions of the tiltable column which means the maximum or minimum angle. This position is limited by the lengths of the arch of the fixed gear portion.

DE-A-3016212 refers to a steering column being tiltable and adjustable with regard to their lengths. The steering column is of a telescopic design, the bottom portion on the telescopic steering column being tiltably mounted on the car-body. In order to fix the respective position of the telescopic steering column, there is provided a strut the upper end portion thereof being clampable against the steering column. In order to achieve this clamping or locking there is provided a sleeve enclosing toothed bars, one being connected to the steering column, the other being connected to the strut. Both bars are clamped by the sleeve by frictional forces. This results in a weak construction which will loosen by vibrations caused by the vehicle body.

It is an object of the present invention to provide a tilt steering column assembly according to the preamble portion of claim 1 which is simple in construction, reliable in locking performance, which is failsave and which is easy to fabricate, low in costs and light in weight and provides an arrangement for holding a tilt spring in an effective posture.

According to the invention, the object is solved by the features of claim 1; the sub-claims contain further positive developments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a view showing, partly in section, a tilt st ering column assembly according to one embodiment of the present invention.

Fig. 2 is a perspective view showing various members of a tilt lock mechanism of the tilt steering column assembly of Fig. 1.

Fig. 3 is a sectional view taken along a line A-A shown in in Fig. 1.

Fig. 4 is a sectional view taken along a line B-B shown in Fig. 1.

Fig. 5 is a plan view showing the tilt steering column assembly of Fig. 1.

Fig. 6 is a view for showing a released state of the tilt lock mechanism shown in Figs. 1 and 2

Fig. 7 is a view for showing a locked standard state of the tilt lock mechanism shown in Figs. 1 and 2.

Fig. 8 is a sectional view, taken across a line A-A of Fig. 7, for showing a first support arrangement including a barrel-shaped collar received in a conical hole.

Fig. 9 is a sectional view, taken across a line B-B of Fig. 7, for showing a second support arrangement also including a barrel-shaped collar received in a conical hole.

Fig. 10 is an enlarged sectional view showing the first support arrangement of Fig. 8.

Fig. 11 is a sectional view showing a mounting bracket of the steering column assembly shown in Figs. 1 and 2.

Fig. 12 is a perspective view showing the mounting bracket of Fig. 11 and an impact energy absorbing member used in the steering column assembly of Fig. 1.

Fig. 13 is a view showing, in an developed state, the mounting bracket of the steering column assembly shown in Figs. 1 and 2.

DETAILED DESCRIPTION OF THE INVENTION

One embodiment of the present invention is shown in Figs. 1~13.

A tilt steering column assembly of this embodiment includes a mounting bracket (or fixed bracket) 1, a lower steering column 2, a movable bracket 3, a tilt hinge 4, an upper steering column 5, an upper steering shaft 7, a universal joint 6, and a lower steering shaft 8. The mounting bracket 1 is adapted to be fixed to a vehicle body of a vehicle such as an automobile. The lower column 2 is supported by the fixed bracket 1. A hinge bracket 2a is fixed to an upper end of the lower column 2. The tilt hinge 4 serves as a tilt center. The movable bracket 3 is rotatably connected with the hinge bracket 2a of the lower column 2 by the tilt hinge 4. The upper column 5 is fixed to the movable bracket 3. Therefore, the movable bracket 3 and the upper column 5 are swingable about the axis of the tilt hinge 4. The upper steering shaft 7 is received in the upper steering column 5, and the lower steering shaft 8 is received in the lower steering column 2. The upper and lower steering shafts 7 and 8 are connected by the universal joint 6 which permits angular displacement and transmits rotation between both shafts 7 and 8. The column assembly further includes a tilt spring 44 (shown in Fig. 2) and a center lock type tilt lock mechanism 45 which is provided under an upper end portion of the lower column 2 and the movable bracket 3. In this embodiment, the tilt spring 44 is provided in the tilt lock mechanism 45. The tilt spring 44 is arranged to cause the upper column 5 to swing upwardly when the tilt lock mechanism 45 is put in an unlocked state. The tilt hinge of this embodiment has left and right units as shown in Fig. 3.

The tilt lock mechanism 45 includes lower and upper support brackets 9 and 10, and first and second (upper and lower) toothed members (or toothed bars) 12 and 13. The lower support bracket 9 is fixed to an underside of the lower column 2, and the upper support bracket 10 is fixed to an underside of the movable bracket 3. The lower support bracket 9 projects downwardly from the upper end of the lower column 2, and the upper support bracket 10 projects downwardly from the lower end of the upper column 5. The upper support bracket 10 has first and second (right and left) arms each of which is formed with a hole 10a. Each of the toothed members 12 and 13 is shaped like a bar. The first (upper) toothed member 12 has a base end portion which is placed between the first and second arms of the upper support bracket 10, and rotatably supported by a support bolt 11 inserted through the holes 10a of the upper support bracket 10. The lower support bracket 9 has first and second (right and left) arms each of which is formed with a hole 9a. The second (lower) toothed member 13 has a base end portion which is placed between the first and second arms of the lower support bracket 9, and rotatably supported by a support bolt 14 inserted through the holes 9a of the lower support bracket 9. Each of the toothed members 12 and 13 has a toothed portion 12a or 13a. The toothed portions 12a and 13a of the first and second (upper and lower) toothed members 12 and 13 overlap each other. The toothed portion 12a or 13a of each toothed member 12 or 13 has parallel teeth extending along a widthwise direction which is perpendicular to a lengthwise direction of the bar-shaped toothed member 12 or 13. Thus, each toothed member 12 or 13 is in the form of a rack.

The support bolts 11 and 14 are substantially parallel to each other, and substantially perpendicular to an imaginary vertical plane which contains the axis of the lower column 2. The teeth of the upper and lower toothed members 12 and 13 are substantially parallel to the axes of the bolts 11 and 14. The bolt 14 is closer to the lower end of the lower column 2 than the bolt 11 is. In this embodiment, the first toothed member 12 is placed on the second toothed member 13. The teeth of the upper first toothed member 12 are formed in a downwardly facing lower surface which is substantially flat. The teeth of the lower second toothed member 13 are formed in a substantially flat upwardly facing upper surface.

The support bolt 11 is inserted, as shown in Fig. 8, through a barrel-shaped collar 15 which is received in a conical hole 16 formed in the base portion of the upper (first) toothed member 12. As shown in Fig. 9, the sup-

port bolt 14 is inserted through a barrel-shaped collar 18 which is received in a conical hole 19 formed in the base portion of the lower (second) toothed member 13. Each of the barrel-shaped collars 15 and 18 has a circular cross section. The outside diameter of each barrel-shaped collar 15 and 18 is largest at the middle, and decreases gradually from the middle to each of the left and right ends. As shown in Fig. 10, each barrel-shaped collar has left and right flat circular ends and a curved outside surface generated by rotating an arched line around an axis. The left and right ends of each barrel-shaped collar 15 or 18 are equal in outside diameter. Each barrel-shaped collar 15 or 18 has a center bore extending between the left and right ends. The center bore is circular and straight. The conical hole 16 or 19 of each of the upper and lower toothed members 12 and 13 is shaped like a truncated cone (or a frustum of a right circular cone), and has an inside conical surface facing radially inwardly. Each of the conical holes 16 and 19 has a first circular open end and a second circular open end which is smaller in diameter than the first end. The diameter S of the smaller second open end of the conical hole 16 is smaller than the diameter L of the middle of the barrel-shaped collar 15, as shown in Fig. 10. Therefore, the barrel-shaped collar 15 cannot pass through the second smaller open end of the conical hole 16. The upper toothed member 12 cannot be extracted from the collar 15. Similarly, the diameter of the smaller second end of the conical hole 19 is smaller than the diameter of the middle of the barrel-shaped collar 18, so that the collar 18 cannot pass through the smaller second end of the conical hole 19. The lower toothed member 13 cannot be extracted from the collar 18. There is further provided a biasing means for applying an axial biasing force holding each barrel-shaped collar in the corresponding conical hole. In this embodiment, the basing means comprises two wave washers. A first wave washer 17 is disposed between the upper support bracket 10 and the base portion of the upper toothed member 12. The wave washer 17 adjoins the smaller second end of the conical hole 16 of the upper toothed member 12, and abuts a wall surface surrounding the second end of the conical hole 16. From the wave washer 17, the upper toothed member 12 receives a pushing force acting in a direction from the smaller second end toward the larger first end of the conical hole 16. Similarly, a second wave washer 20 is disposed between the lower support bracket 9 and the base portion of the lower toothed member 13. The wave washer 20 is also located on the second side on which the smaller second end of the conical hole 19 is located. The waver washer 20 pushes a wall surface of the base portion of the lower toothed member 13 around the second end of the conical hole 19 in a direction from the second end toward the first end of the conical hole 19. It is possible to employ resilient m mber of various type in place of the wave washers.

The tilt lock mechanism 45 further includes a manual perating lever 21, a lock member (lever) 27 and a guide member (or guide bracket) 30. The lower toothed member 13 has first and second (right and left) sides each of which is formed with a guide groove 22. The grooves 22 extend in the lengthwise direction of the toothed member 13. The upper toothed member 12 has a forward end portion having a hole through which a pin 23 is inserted. The pin 23 extends in the widthwise direction of the upper toothed member 12, and projects outwardly on both sides of the upper toothed member 12 so that the pin 23 serves as outward projections. The lock member 27 has a U-shaped portion 26 having first and second (right and left) side upright walls each of which is formed with an inclined slot 25 and an inward projection 24 which is, in this embodiment, formed by embossing. The upper toothed member 12 is placed between the upright walls of the U-shaped portion 26 of the lock member 27. The pin 23 is received in the inclined slots 25 of the lock member 27. The inward projection 24 extends inwardly from the inside surface of each upright side wall of the U-shaped portion 26. The lower toothed member 13 is placed between the upright side walls of the U-shaped portion 26, and the inward projections 24 are slidably received in the grooves 22 of the lower toothed member 13. The lock member 27 extends from the U-shaped portion 26 to an end portion 28.

The U-shaped portion 26 of the lock member 27 has a flat bottom extending between the lower ends of the first and second upright walls. Each inclined slot 25 slopes down from an upper end 25a to a lower end 25b. The upper end 25a of each inclined slot 25 is remoter from the flat bottom of the U-shaped portion 26 than the lower end 25b. The lower end 25b is closer to the flat bottom of the U-shaped portion 26. On each side, the distance of the upper end 25a of the inclined slot 25 from the groove 22 of the lower toothed member 13 is greater than the distance of the lower end 25a of the inclined slot 25 from the groove 22.

The manual lever 21 has an intermediate portion formed with a hole 21a, a base end portion formed with a hole 21b, and a grip portion. The intermediate portion is intermediate between the grip portion and the base end portion. The end portion 28 of the lock member 27 is pivotally connected with the intermediate portion of the manual lever 21 by a pin 29. In this example, the end portion 28 of the lock member 27 is formed with an U-shaped recess. The pin 29 is inserted through the hole 21a of the manual lever 21, and fixed to the intermediate portion of the manual lever 21. The pin 29 is engaged in the U-shaped recess of the end portion 28 of the lock member 27. The guide member 30 has a lever support portion 39 which is formed with a hole 31. A pin 32 is inserted through the hole 21b of the manual lever 21 and the hole 31 of the guide member 30. Thus, the base end portion of the operating lever 21 is pivotally supported by the support portion 39 of the guide member 30. The manual operating lever 21 is swingable about the pin 32. Each of the upright side walls of the U-shaped portion 26 of the lock member 27 is formed with a spring seat portion 34 in the form of an outward flange. A lock spring 33 is disposed under compression between the U-shaped

portion 26 of the lock member 27 and the upper toothed member 12 through a spring seat 35 and the seat portions 34 of the lock member 27.

The guide member (bracket) 30 is in the form of a plate held substantially vertically, and extends substantially along the axis of the lower column 2. The guide member 30 has a circular hole 36, an elongated hole 37 and a rectangular hole 38 which is located between the circular hole 36 and the elongated hole 37. The guide member 30 has first and second end portions, and extends from the first end portion to the second end portion. The elongated hole 37 is formed in the first end portion of the guide member 30. The lever support portion 31 is formed in the second end portion of the guide member 30. The second end portion of the guide member 30 is further formed with a spring receiving portion 43. The circular hole 36 is formed between the rectangular hole 38 and the second end portion of the guide member 30. Each of the lever support portion 39 and the spring receiving portion 42 is formed by bending an integral part of the guide member 30 which is in the form of a plate. The lever support portion 39 and the spring receiving portion 42 are both flat and perpendicular to each other.

The lower support bracket 9 has a spring receiving portion 40. In this embodiment, the spring receiving portion 40 projects outwardly from an end of the first arm of the support bracket 9. The spring receiving portion 40 has a spring receiving flat surface lying in an imaginary plane which is perpendicular to a column axis of the lower steering column 2. The spring receiving portion 40 is perpendicular to the first arm of the support bracket 9. The first and second arms and the spring receiving portion 40 of the support bracket 9 are all integral parts of a jointless single piece. A spring seat 41 is formed in the flat surface of the spring receiving portion 40. The spring seat 41 is in the form of a projection formed by embossing. The spring receiving portion 41 is loosely received in the rectangular hole 38 of the guide bracket 30. The spring receiving portion 42 of the guide bracket 30 has a spring receiving flat surface which faces toward the spring receiving surface of the spring receiving portion 40 of the support bracket 9, and which lies in a plane perpendicular to the column axis. In the spring receiving surface of the spring receiving portion 42, there is formed a spring seat 43 in the form of a projection formed by embossing. The spring 44 is disposed between the spring receiving portions 40 of the support bracket 9 and the spring receiving portion 42 of the guide bracket 30. The spring 44 of this embodiment is a coil spring having hookless ends. One end of the spring 44 is engaged with the spring seat 41, and the other spring end is engaged with the spring seat 43, as shown in Figs. 3 and 4.

When the driver pulls the grip of the manual operating lever 21 toward himself, the manual lever 21 swings about the pin 32, and pulls the lock m mber 27 in the rightward direction as viewed in Fig. 1 against the force of the lock spring 33. During this rightward movement of the lock member 27, the projections 24 of the lock member 27 slides along the grooves 22 of the lower toothed member 13, and the pin 23 of the upper toothed member 12 slides along the inclined slots 25 of the lock member 27 in the uphill direction from the lower ends 25b toward the upper ends 25a which is closer to the column axis of the lower column 2 than the lower end 25b. Therefore, the toothed portion 12a of the upper toothed member 12 is slightly lifted up and disengaged from the toothed portion 13a of the lower toothed member 13.

When the toothed portions 12a and 13a are disengaged, the force of the tilt spring 44 immediately causes the movable bracket 3 to swing about the axis of the tilt hinge 4 to the uppermost position shown in Fig. 6. In this swinging movement of the movable bracket 3, the bolt 11 of the movable support bracket 10 swings about the tilt hinge 4 together with the movable bracket 3. Since the bolt 11 is inserted through the circular hole 36 of the guide member 30, the swing movement of the bolt 11 causes the guide member 30 to move rightward as viewed in Fig. 6 substantially along a straight line. This movement of the guide member 30 is substantially a translational motion. During this movement, the elongated hole 37 of the guide member 30 moves rightward as viewed in Fig. 6, and one end of the elongated hole 37 abuts against the bolt 14 to limit the translation movement of the guide member 30 and the swing movement of the movable support bracket 10. In this way, the steering wheel mounted on the upper shaft 7 is sprung up to the uppermost position corresponding to the uppermost position of the movable bracket 3 and the upper shaft 7 shown in Fig. 6, and held at the uppermost position.

In this mechanism, the guide member 30 is designed to move translationally along the straight line which is parallel to the column axis of the lower column 2 with no or little up and down displacement. Therefore, the spring receiving portions 42 of the guide member 30 is always held in parallel to the spring receiving portion 40 of the support bracket 9, and the spring seat 43 is always held in alighnment with the spring seat 41 of the support bracket 9. As a result, the tilt spring 44 can apply its biasing force effectively without being bent.

In the unlocked state of the steering assembly shown in Fig. 6, the driver can move the steering wheel to a desired angular position. When the manual lever 21 is pushed back to the original position with the steering wheel held at a desired angular position, the lock member 27 moves leftward as viewed in Figs. 1 and 6. This movement causes the pin 23 to slide down in the inclined slots 25 toward the lower ends 25b which is closer to the lower toothed member 13 than the upper end 25a. Therefore, the upper toothed member 13 moves downwardly away from the lower column 2, and the toothed portions 12a and 13a of the upper and lower toothed members 12 and 13 are put in engagement with each other again. This engagement is maintained by the force of the lock spring 33.

Figs. 11, 12 and 13 shows the mounting bracket 1. As shown in Fig. 12, the mounting bracket 1 has an upper mounting portion (or top portion) 110 having left and right upper end portions each of which is formed with an elon-

gated bolt hole 111 through which a fastening bolt is inserted, and left and right leg portions 112. The leg portions 112 extend downwardly from the upper mounting portion 110. The leg portions 112 and the upper mounting portion 110 are all integral parts of a jointless single piece, and they are shaped, as a whole, like an inverted letter U. The leg portions 112 extend in parallel to each other, and they are separated from each other at a predetermined distance D as shown in Fig. 11. An impact energy absorbing member 113 is attached to the lower steering column 2, and placed between the leg portions 112 of the mounting bracket 1. The impact energy absorbing member 113 is partly connected with the leg portions 112. There are further provided rollers 114 for promoting curling of the impact energy absorbing member 113, and a cover 15 for covering the impact energy absorbing member 113.

The mounting bracket 1 is formed by bending (or folding) a single metal plate such as a sheet metal. Fig. 13 shows a metal plate 116 employed in this embodiment. The metal plate 116 has a T-shaped cut portion 117, a U-shaped cut portion 118 and the above-mentioned left and right elongated bolt holes 111. These void portions 117, 118 and 111 are all formed in the metal plate 116 which has an original shape resembling a polygon. The plate 116 is shaped like a an axially symmetric figure symmetric with respect to a center line C-C shown in Fig. 13. That is, the plate 116 consists of left and right halves each of which is substantially a mirror image of the other. The elongated holes 111 are elongated in parallel to the center line C-C on both sides of the center line C-C. The T-shaped cut portion 117 consists of a center slit and an interior transverse slit. Both slits are straight and narrow. The transverse slit extends along a line perpendicular to the center line C-C, and the imaginary center line C-C divides (or bisects) the transverse slit into left and right halves of an equal length. The center slit extends along the center line C-C, and reaches the middle of the transverse slit on the center line C-C. The center slit of the T-shaped cut portion 117 opens in one side of the polygonal plate 116, and the U-shaped cut portion 118 opens in the opposite side of the plate 116. The T-shaped cut portion 117 and the U-shaped cut portion 118 are separated by the mounting portion 110 extending along a line perpendicular to the center line C-C. The elongated holes 111 are formed, respectively, in the left and right end portions of the mounting portion 110.

The leg portions 112 shown in Fig. 12 are formed by bending triangular side portions 152a and 152b of the plate 116 downwardly along a line "a" perpendicular to the center line C-C, further bending rectangular lower portions 151a and 151b inwardly along two parallel lines "b" parallel to the center line C-C, further bending side portions 153a and 153b downwardly along a line "c" perpendicular to the center line C-C, and further bending marginal portions 154a and 154b along lines "d" parallel to the center line C-C. After the forming operation, the rectangular portions 151a and 151b are parallel and face to face with each other, as shown in Fig. 12. In the assembled state, the lower column 2 is disposed between the rectangular lower portions 151a and 151b. The triangular side portions 152a and 152b face toward the steering wheel, and the triangular side portions 153a and 153b face toward the lower end of the steering column 2. Each side portion serves like a gusset or a brace for reinforcing a corner of a structure. Each rectangular portion 151a or 151b is further bent along two parallel lines "e" and "f" so as to form a step. As shown in Fig. 12, each rectangular portion 151a or 151b has upper and lower flat portions separated by the step. The upper flat portions of the rectangular portions 151a and 151b are wider apart from each other. The steps are so formed that the distance between the parallel lower flat portions of the rectangular portions 151a and 151b is smaller than the distance between the parallel upper flat portions. The mounting portion 110 is bent along lines "g" and "h" on both sides of the center line C-C as shown in Fig. 13. Therefore, as shown in Fig. 12, the mounting portion consists of a raised flat middle portion and the left and right depressed flat end portions. It is possible to further improve the rigidity of the mounting bracket 1 by welding the upper ends 112c of the rectangular portions 151a and 151b to the underside of the mounting portion 110. The completed bracket 1 is substantially symmetrical so that the mounting bracket 1 can be divided by an imaginary median plane into two substantially equal right and left halves like a figure having a bilateral symmetry. Each of the rectangular portion 151a and 151b is further formed with an inwardly projecting hook portion 112a and a rectangular hole 112b formed in the step and the upper portion of the rectangular portion 151a or 151b. The mounting bracket 1 is fixed to the vehicle body by the fastening bolts through the elongated bolt holes 111. For example, the mounting bracket 1 is fixed to the underside of an instrument panel.

The impact energy absorbing member 113 has a central portion which is perpendicular to the axis of the lower column 2, left and right curling portions 120 and left and right arm portions 121. The central portion has a circular hole for receiving the lower column 2. The curling portions 120 are formed on both sides of the central portion, and shaped like a semicylinder. The arm portions 121 are parallel to each other. These portions are all integral parts of a jointless single piece. In this example, the impact energy absorbing member 113 is formed by bending a sheet metal. There are further formed left and right ripping portions 122 in the form of a sharp cut like a crevice. Each ripping portion 122 extends obliquely between the left or right curling portion 120 and the left or right arm portion 121 from the lower end of the curling portion 120. Each arm portion 121 has a claw portion 123 projecting downwardly from the lower end of the arm portion 121. The arm portions 121 are inserted between the rectangular portions 151a and 151b of the fixed bracket 1. The claw portions 123 are engaged in the holes 112a. The lower end of the arm portions 121 of the absorbing member 113 are caught and supported by the

hook portions 112b of the fixed bracket 1. The arm portions 121 of the energy absorbing member 113 are fixed to the leg portions 112 of the fixed bracket 1 by spot welding.

In case of a head on collision of the vehicle, a secondary collision between the driver and the steering wheel causes an impact load which is transmitted through the upper shaft 7, the upper column 5 and the movable bracket 3, to the lower column 2. Therefore, the lower column 2 downwardly pushes the impact energy absorbing member 13 engaged with the mounting bracket 1.

By this downward pushing force, the curling portions 120 each having the roller 114 therein curl along the inner surface of the leg portion 112, and the ripping portions 122 crack open. The impact energy is thus absorbed.

In the tilt lock mechanism of this embodiment of the present invention, the toothed members overlap each other in a wide area, and the teeth in the overlapped portions are all engaged, so that the engagement is strong, secure and free from looseness.

The tilt spring is disposed between the upper and lower columns. The tilt spring of this embodiment has simple spring ends which requires no special forming operation. The arrangement for supporting the tilt spring is very compact and efficient.

The linkage of the lock member, the operating lever and the guide member is so designed that the lock member moves along the lower column. The lock member and guide member are arranged to hold and guide the toothed members so that the toothed members remains parallel to the column axis.

The arrangement for swingably supporting each toothed member is effective for preventing wrong engagement between the toothed members. The combination of the barrel-shaped collar, the conical hole and the waver washer functions to adjust the relative positions of the toothed members, and ensure the complete engagement. The tilt lock mechanism of this embodiment can improve the safety of the vehicle by preventing an accidental release of the tilt lock.

Claims

1. A tilt steering column assembly comprising:

   a column subassembly comprising upper (5) and lower(2) columns which are connected with each other so that said upper column (5) is swingably about a tilt axis; and

   a tilt lock mechanism (45) for allowing said upper column (5) to swing when said tilt lock mechanism (45) is in an unlocked state, and preventing said upper column (5) from swinging when said tilt lock mechanism (45) is in a locked state, said tilt lock mechanism (45) comprising a first toothed member (12) which is supported by said upper column (5), and a second toothed member (13) which is supported by said lower column (2), one of said toothed members (12, 13) being swingably supported, said first (12) and second (13) toothed members being engaged with each other when said tilt lock mechanism (45) is in said locked state, and being disengaged from each other when said tilt lock mechanism (45) is in said unlocked state, characterized in that both toothed members (12, 13) are swingably supported and shaped like a bar.

2. A tilt steering column assembly according to claim 1, characterized in that each of said first (12) and second (13) toothed members extends substantially along an axis of said lower column (2), and comprises teeth which are arranged in a substantially flat plane.

3. A tilt steering column assembly according to claim 2, characterized in that said first toothed member (12) comprises a base end portion which is pivotally supported by said upper column (5) so that said first toothed member (12) is swingable on a first swing axis, said second toothed member (13) comprises a base end portion which is pivotally supported by said upper column (5) so that said second toothed member (13) is swingable on a second swing axis, said first toothed member (12) further comprises a swingable toothed portion (12a) comprising a bottom face which faces downwardly and which is formed with teeth spaced from one another along a straight line, and said second toothed member (13) further comprises a swingable toothed portion (13a) which is located under said toothed portion (12a) of said first toothed member (12) and which comprises a top face facing upwardly toward said bottom face of said first toothed member (12) and having teeth that are spaced from one another along a straight line.

4. A tilt steering column assembly according to one of claims 1 - 3, characterized in that said tilt lock mechanism (45) further comprises a lock member (27) for disengaging said toothed portions of said first (12) and second (13) toothed member from each other when said lock member (27) is moved in a first direction parallel to an axis of said lower column (2) and engaging said toothed portions (12a, 13a) of said toothed members (12, 13) with each other when said lock member (27) is moved in a second direction opposite to said first direction.

5. A tilt steering column assembly according to one of claims 1 - 4, characterized in that said column assembly further comprises a tilt spring (44) which is disposed between said lower (2) and upper (5) columns and which tends to cause said upper column (5) to swing about said tilt axis in an upward direction, and wherein both of said tilt lock mechanism (45) and said tilt spring (44) are located under said column subassembly near said tilt axis.

6. A tilt steering column assembly according to claim 4 or 5, characterized in that said second toothed member (13) is formed with a straight guide groove (22) which extends along a straight line which is substantially perpendicular to said second swing axis, said lock member (27) is formed with an inclined slot (25) and an inward projection (24) which is slidably received in said guide groove (22) of said second toothed member (13), and said first toothed member (12) comprises an outward projection (23) which is slidably received in said inclined slot (25) of said lock member (27).

7. A tilt steering column assembly according to one of claims 1 - 5, characterized in that said tilt lock mechanism (45) further comprises a guide member (30) having a first end pivotally supported by said upper column (5), and a second end which is formed with an elongated hole (37) and which is connected through said elongated hole (37) with said lower column (2) so that said guide member (30) can move along an axis of said lower column (2).

8. A tilt steering column assembly according to claim 7, characterized in that said tilt spring (44) is disposed under compression between said lower column (2) and said guide member (30).

9. A tilt steering column assembly according to claim 7 or 8, characterized in that said tilt lock mechanism (45) further comprises a lower support bracket (9) which is fixed to said lower column (2), and said tilt spring (44) is a coil spring and disposed between a lower spring seat (41) which is formed in said lower support bracket (9) and an upper spring seat (43) which is formed in said guide member (30), said lower (41) and upper (43) spring seats of said lower support bracket (9) and said guide member (30) being arranged substantially in a straight line parallel to said axis of said lower column (2) so that an axis of said tilt spring (44) is held substantially in parallel to said axis of said lower column (2).

10. A tilt steering column assembly according to one of claims 4 - 9, characterized in that said second toothed member (13) is formed with left and right straight guide grooves (22) which extend along a straight line which is substantially perpendicular to said second swing axis, said lock member (27) is formed with left and right inclined slots (25) and left and right inward projections (24) which are slidably received in said guide grooves (22) of said second toothed member (13), and said first toothed member (12) comprises outward projections (23) which are slidably received in said inclined slots (25) of said lock member (27).

11. A tilt steering column assembly according to one of claims 3 - 10, characterized in that said base end portion of one of said first (12) and second (13) toothed members is formed with a conical hole (16, 19) having an inside surface which is a curved surface of a truncated cone, and swingably supported through a barrel-shaped collar (15, 18) which is confined in said conical hole (16, 19).

12. A tilt steering column assembly according to one of claims 3 - 10, characterized in that said first toothed member (12) comprises a guide pin (23) and a conical hole (16) formed in said base end portion of said first toothed member (12), and said second toothed member (13) comprises a conical hole (19), said conical hole (16, 19) of each of said first (12) and second (13) toothed members having an inside surface which is a curved surface of a truncated right circular cone, and

in that said tilt lock mechanism (45) further comprises a first barrel-shaped collar (15) received in said conical hole (16) of said first toothed member (12), and a second barrel-shaped collar (18) received in said conical hole (19) of said second toothed member (13), said first toothed member (12) being pivotally supported through said first barrel-shaped collar (15) on said upper column (5), said second toothed member (13) being pivotally supported through said second barrel-shaped collar (18) on said lower column (2).

13. A tilt steering column assembly according to one of claims 9 - 12, characterized in that said tilt lock mechanism (45) further comprises an upper support bracket (10) which is fixed to an underside of said upper column (5), and which comprises first and second arms between which said base end portion of said first toothed member (12) is placed, said lower support bracket (9) being fixed to an underside of said lower column (2) and comprising first and second arms between which said base end portion of said second toothed member (13) is placed, and

in that said first toothed member (12) is swingably supported by a first bolt (11) which is inserted through a center bore formed in said first barrel-shaped collar (15) and through said conical hole (16) of said first toothed member (12) and which is supported by said first and second arms of said upper support bracket (10), and said second toothed member (13) is swingably supported by a second bolt (14) which is inserted through a center bore formed in said second barrel-shaped collar (18) and through said conical hole of said second toothed member (13) and which is supported by said first and second arms of said lower support bracket (9).

14. A tilt steering column assembly according t claim 13, characterized in that said second bolt (14) is inserted through said elongated hole (37) of said guide member (30), and said first bolt (11) is inserted through a hole in said first end of said guide member

(30) so that an axis of said first bolt (11) is held substantially stationary relative to said guide member (30).

15. A tilt steering column assembly according to claim 14, characterized in that said tilt lock mechanism (45) further comprises a first wave washer (17) for pushing one of said first barrel-shaped collar (15) and said first toothed member (12) against the other, and a second wave washer (20) for pushing one of said second barrel-shaped collar (18) and said second toothed member (13) against the other, said first wave washer (17) being mounted on said first bolt (11) between said first and second arms of said upper support bracket (10), and said second wave washer (20) being mounted on said second bolt (14) between said first and second arms of said lower support bracket (9).

16. A tilt steering column assembly according to one of claims 7 - 15, characterized in that said tilt lock mechanism (45) further comprises an operating lever (21) comprising a swingable end portion, a base end portion pivotally supported by said first end of said guide member (30), and an intermediate portion which is located between said swingable end portion and said base end portion of said operating lever (21) and which is pivotally connected with said lock member (27).

17. A tilt steering column assembly according to one of claims 9 - 16, characterized in that said guide member (30) comprises a rectangular hole (38) formed between said first and second ends, and said lower support bracket (9) comprises a spring receiving portion (40) which is formed with said lower spring seat (41), and which is loosely received in said rectangular hole (38) of said guide member (30).

18. A tilt steering column assembly according to claim 17, characterized in that said teeth of said first toothed member (12) are all straight and substantially parallel to said axis of said conical hole (16) of said first toothed member (12), and said teeth of said second toothed member (13) are all straight and substantially parallel to said axis of said conical hole (19) of said second toothed member (13),

in that said operating lever (21) is swingable about a lever axis which extends substantially along a line perpendicular to said axis of said lower column (2),

in that said tilt lock mechanism (45) further comprises a lock spring (33) for holding said first (12) and second (13) toothed members engaged with each other, said lock spring (33) being disposed between said lock member (27) and said first toothed member (12),

and in that said lock member (27) comprises first and second upright wall portions which are flat and parallel to each other, and a flat bottom portion which extends between said first and second upright wall portions and which is substantially perpendicular to said first and second upright wall portions, said first (12) and second (13) toothed members being placed between said first and second upright wall portions of said lock member (27), said inclined slots (25) of said lock member (27) being formed, respectively, in said first and second upright wall portions, each of said inclined slot (25) extending along a straight line which is inclined with respect to said flat bottom portion, said first toothed member (12) being linked with said lock member (27) through said pin (11) received in said inclined slots (25) so that a rectilinear motion of said lock member (27) causes a swing motion of said first toothed member (12).

19. A tilt steering column assembly according to one of claims 1 - 18, characterized in that said column subassembly comprises a mounting bracket (1) for supporting said lower column (2), said mounting bracket (1) comprising an upper portion, left and right first side portions and left and right lower portions which extend downwardly under said upper portion, said lower column (2) being disposed between said left and right lower portions under said upper portion, said mounting bracket (1) being a jointless single metal piece in the form of a shaped metal sheet, and said upper portion, side portions and lower portions of said mounting bracket (1) being all integral parts of said single metal piece, each of said left and right side portions extending downwardly from said upper portion, said left lower portion extending from said left side portion, and said right lower portion extending from said right side portion.

20. A tilt steering column assembly according to claim 19, characterized in that said upper portion of said mounting bracket (1) comprises left and right flat end portions and a middle portion lying between said left and right flat end portions, said left first side portion being flat and perpendicular to said left end portion and extending downwardly from a first side of said left end portion, said right side portion being flat and perpendicular to said right end portion and extending downwardly from a first side of said right end portion, said left lower portion being flat and perpendicular to said left side portion, said right lower portion being flat and perpendicular to said right side portion.

21. A tilt steering column assembly according to claim 19 or 20, characterized in that said mounting bracket (1) comprises a first edge formed between said left end portion and said left sid portion, a second edge formed between said right end portion and said right side portion, a third edge formed between said left side portion and said left lower portion and a fourth edge formed between said right side portion and

said right lower portion, said first and second edges extending along a horizontal straight line and being aligned, each of said third and fourth edges extending downwardly along a line perpendicular to said horizontal straight line.

22. A tilt steering column assembly according to one of claims 19, 21, characterized in that said mounting bracket (1) comprises left and right elongated holes (111) which are formed, respetively, in said left and right end portions and which extend along said axis of said lower column (2).

23. A tilt steering column assembly according to one of claims 19, 22, characterized in that said mounting bracket (1) further comprises left and right second side portions extending downwardly, respectively, from second sides of said left and right end portions, and in that said mounting bracket (1) is symmetrical so that said mounting bracket (1) can be divided by an imaginary median plane into left and right halves each of which is substantially a mirror image of the other.

24. A tilt steering column assembly according to one of claims 19 - 23, characterized in that said mounting bracket (1) is formed by bending an original thin metal plate which is flat and symmetrical with respect to a center line, and which comprises a U-shaped cut portion and a T-shaped cut portion each of which is symmetrical with respect to said center line.

Patentansprüche

1. Schwenkbare Lenksäulenanordnung, mit:
einer Säulen-Untereinheit mit einer oberen (5) und einer unteren (2) Säule, welche derart miteinander verbunden sind, daß die obere Säule (5) um eine Schwenkachse schwenkbar ist; und
einem Schwenk-Sperrmechanismus (45), welcher ein Schwenken der oberen Säule (5) ermöglicht, wenn der Schwenk-Sperrmechanismus (45) sich in einem gelösten Zustand befindet, und welcher ein Schwenken der oberen Säule (5) verhindert, wenn der Schwenk-Sperrmechanismus (45) in einem Sperrzustand ist, wobei der Schwenk-Sperrmechanismus (45) ein erstes Element (12) mit Verzahnung, welches durch die obere Säule (5) gestützt wird, und ein zweites Element (13) mit Verzahnung aufweist, welches durch die untere Säule (2) gestützt wird, wobei eines der Elemente (12, 13) mit Verzahnung schwenkbar gestützt ist und das erste (12) und das zweite (13) Element mit Verzahnung ineinander eingreifen, wenn der Schwenk-Sp rrmechanismus (45) im Sperrzustand ist, und sich voneinander lösen, wenn der Schwenk-Sperrmechanismus (45) sich im gelösten Zustand befindet,
dadurch gekennzeichnet, daß beide Elemente (12, 13) mit Verzahnung schwenkbar gestützt und stabförmig sind.

2. Schwenkbare Lenksäulenanordnung nach Anspruch 1, dadurch gekennzeichnet, daß sowohl das erste (12) als auch das zweite (13) Element mit Verzahnung im wesentlichen entlang einer Achse der unteren Säule (2) verläuft und Zähne aufweist, welche in einer im wesentlichen flachen Ebene angeordnet sind.

3. Schwenkbare Lenksäulenanordnung nach Anspruch 2, dadurch gekennzeichnet, daß das erste Element (12) mit Verzahnung einen Basisendbereich aufweist, welcher schwenkbar durch die obere Säule (5) gestützt ist, so daß das erste Element (12) mit Verzahnung auf einer ersten Schwenkachse schwenkbar ist, daß das zweite Element (13) mit Verzahnung einen Basisendbereich aufweist, welcher durch die obere Säule (5) derart schwenkbar gestützt ist, daß das zweite Element (13) mit Verzahnung auf einer zweiten Schwenkachse schwenkbar ist, wobei das erste Element (12) mit Verzahnung ferner einen schwenkbaren verzahnten Bereich (12a) mit einer Bodenfläche aufweist, welche nach unten gerichtet und mit Zähnen ausgebildet ist, die voneinander entlang einer geraden Linie beabstandet sind, und das zweite Element (13) mit Verzahnung ferner einen schwenkbaren verzahnten Bereich (13a) aufweist, welcher unter dem verzahnten Bereich (12a) des ersten Elementes (12) mit Verzahnung angeordnet ist und eine obere Fläche aufweist, die zur Bodenfläche des ersten Elementes (12) mit Verzahnung nach oben gerichtet ist und Zähne aufweist, welche voneinander entlang einer geraden Linie beabstandet sind.

4. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner ein Sperrelement (27) aufweist, zum Lösen der verzahnten Bereiche des ersten (12) und zweiten (13) Elementes mit Verzahnung voneinander, wenn das Sperrelement (27) in eine erste Richtung parallel zu einer Achse der unteren Säule (2) bewegt wird, und zum ineinander Eingreifen der verzahnten Bereiche (12a, 13a) der Elemente (12, 13) mit Verzahnung, wenn das Sperrelement (27) in eine zweite Richtung entgegengesetzt zur ersten Richtung bewegt wird.

5. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Säulenanordnung ferner eine Schwenkfeder (44) aufweist, welche zwischen der unteren (2) und der oberen (5) Säule angeordnet ist und welche dazu tendiert, ein Schwenken der oberen Säule (5) um die Schwenkachse in eine nach oben gerichtete Richtung zu bewirken, und wobei sowohl der Schwenk-Sperrmechanismus (45) und die Schwenk-

feder (44) unter der Säulen-Untereinheit nahe der Schwenkachse angeordnet sind.

6. Schwenkbare Lenksäulenanordnung nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß das zweite Element (13) mit Verzahnung mit einer geraden Führungsnut (22) ausgebildet ist, welche entlang einer geraden Linie verläuft, die im wesentlichen senkrecht zur zweiten Schwenkachse ist, wobei das Sperrelement (27) mit einem geneigten Schlitz (25) und einem Innenvorsprung (24) ausgebildet ist, welcher in der Führungsnut (22) des zweiten Elementes (13) mit Verzahnung gleitend aufgenommen ist, und das erste Element (12) mit Verzahnung umfaßt einen Außenvorsprung (23), welcher gleitend in dem geneigten Schlitz (25) des Sperrelementes (27) aufgenommen ist.

7. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner ein Führungselement (30) mit einem ersten Ende aufweist, welches schwenkbar durch die obere Säule (5) gestützt ist, sowie ein zweites Ende, welches mit einer länglichen Öffnung (37) ausgestaltet und welches durch die längliche Öffnung (37) mit der unteren Säule (2) derart verbunden ist, daß das Führungselement (30) sich entlang einer Achse der unteren Säule (2) bewegen kann.

8. Schwenkbare Lenksäulenanordnung nach Anspruch 7, dadurch gekennzeichnet, daß die Schwenkfeder (44) unter Druck zwischen der unteren Säule (2) und dem Führungselement (30) angeordnet ist.

9. Schwenkbare Lenksäulenanordnung nach Anspruch 7 oder 8, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner einen unteren Stützwinkel (9) aufweist, welcher an der unteren Säule (2) befestigt ist, und die Schwenkfeder (44) eine Spiralfeder ist und zwischen einem unteren Federsitz (41), der in dem unteren Stützwinkel (9) ausgebildet ist, und einem oberen Federsitz (43) angeordnet ist, welcher in dem Führungselement (30) ausgestaltet ist, wobei der untere (41) und der obere (43) Federsitz des unteren Stützwinkels (9) und das Führungselement (30) im wesentlichen in einer geraden Linie parallel zur Achse der unteren Säule (2) derart angeordnet sind, daß eine Achse der Schwenkfeder (44) im wesentlichen parallel zur Achse der unteren Säule (2) gehalten wird.

10. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 4 bis 9, dadurch gekennzeichnet, daß das zweite Element (13) mit Verzahnung mit linken und rechten geraden Führungsnuten (22) ausgebildet ist, welche entlang einer geraden Linie verlaufen, welche im wesentlichen senkrecht zur zweiten Schwenkachse ist, daß das Sperrelement (27) mit linken und rechten geneigten Schlitzen (25) und linken und rechten Innenvorsprüngen (24) ausgebildet ist, welche gleitend in den Führungsnuten (22) des zweiten Elementes (13) mit Verzahnung aufgenommen sind, und daß das erste Element (12) mit Verzahnung Außenvorsprünge (23) aufweist, welche gleitend in den geneigten Schlitzen (25) des Sperrelementes (27) aufgenommen sind.

11. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 3 bis 10, dadurch gekennzeichnet, daß der Basisendbereich des ersten (12) oder zweiten (13) Elementes mit Verzahnung mit einer konischen Öffnung (16, 19) ausgebildet ist, welche eine Innenoberfläche aufweist, die eine gekrümmte Oberfläche eines Kegelstumpfes darstellt und schwenkbar durch eine zylindrische Buchse (15, 18) gestützt wird, welche in der konischen Öffnung (16, 19) festgelegt ist.

12. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 3 bis 10, dadurch gekennzeichnet, daß das erste Element (12) mit Verzahnung einen Führungsstift (23) und eine konische Öffnung (16) aufweist, welche in dem Basisendbereich des ersten Elementes (12) mit Verzahnung ausgebildet sind, und daß das zweite Element (13) mit Verzahnung eine konische Öffnung (19) aufweist, wobei die konische Öffnung (16, 19) sowohl des ersten (12) als auch des zweiten (13) Elementes mit Verzahnung eine Innenoberfläche aufweist, die eine gekrümmte Oberfläche eines geraden kreisförmigen Kegelstumpfes darstellt, und
daß der Schwenk-Sperrmechanismus (45) ferner eine erste zylinderförmige Buchse (50) aufweist, welche in der konischen Öffnung (16) des ersten Elementes (12) mit Verzahnung aufgenommen ist, sowie eine zweite zylindrische Buchse (18), welche in der konischen Öffnung (19) des zweiten Elementes (13) mit Verzahnung aufgenommen ist, wobei das erste Element (12) mit Verzahnung schwenkbar durch die erste zylinderförmige Buchse (15) auf der oberen Säule (5) gestützt wird, und das zweite Element (13) mit Verzahnung schwenkbar durch die zweite zylinderförmige Buchse (18) auf der unteren Säule (2) gestützt wird.

13. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 9 bis 12, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner einen oberen Stützwinkel (10) aufweist, welcher an einer Unterseite der oberen Säule (5) befestigt ist und welcher erste und zweite Schenkel aufweist, zwischen denen der Basisendbereich des ersten Elementes (12) mit Verzahnung angeordnet ist, wobei der untere Stützwinkel (9) an einer Unterseite der unteren Säule (2) befestigt ist und erste und zweite Schenkel aufweist, zwischen denen der

Basisendbereich des zweiten Elementes (13) mit Verzahnung angeordnet ist, und
daß das erste Element (12) mit Verzahnung schwenkbar durch einen ersten Bolzen (11) gestützt wird, welcher durch eine Mittelbohrung, welche in der ersten Zylinderförmigen Buchse (15) ausgebildet ist, und durch die konische Öffnung (16) des ersten Elementes (12) mit Verzahnung eingefügt ist, und welcher durch die ersten und zweiten Schenkel des oberen Stützwinkels (10) gestützt wird, und das zweite Element (13) mit Verzahnung ist durch einen zweiten Bolzen (14) schwenkbar gestützt, welcher durch eine Mittelbohrung, die in der zweiten zylindrischen Buchse (18) ausgebildet ist, und durch die konische Öffnung des zweiten Elementes (13) mit Verzahnung eingefügt ist, und welcher durch die ersten und zweiten Schenkel des unteren Stützwinkels (9) gestützt wird.

14. Schwenkbare Lenksäulenanordnung nach Anspruch 13, dadurch gekennzeichnet, daß der zweite Bolzen (14) durch die längliche Öffnung (37) des Führungselements (30) eingefügt ist, und daß der erste Bolzen (11) durch eine Öffnung im ersten Ende des Führungselementes (30) eingefügt ist, so daß eine Achse des ersten Bolzens (11) im wesentlichen stationär relativ zum Führungselement (30) gehalten wird.

15. Schwenkbare Lenksäulenanordnung nach Anspruch 14, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner eine erste Wellenscheibe (17) aufweist, um die erste zylinderförmige Buchse (15) und das erste Element (12) mit Verzahnung gegeneinander zu drücken, sowie eine zweite Wellenscheibe (20), um die zweite zylinderförmige Buchse (18) und das zweite Element (13) mit Verzahnung gegeneinander zu drücken, wobei die erste Wellenscheibe (17) auf dem ersten Bolzen (11) zwischen den ersten und zweiten Schenkeln des oberen Stützwinkels (10) montiert ist, und die zweite Wellenscheibe (20) auf dem zweiten Bolzen (14) zwischen den ersten und zweiten Schenkeln des unteren Stützwinkels (9) befestigt ist.

16. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 7 bis 15, dadurch gekennzeichnet, daß der Schwenk-Sperrmechanismus (45) ferner einen Betätigungshebel (21) aufweist, welcher einen schwenkbaren Endbereich, einen Basisendbereich, der schwenkbar durch das erste Ende des Führungselementes (30) gestützt wird, und einen Zwischenbereich aufweist, welcher zwischen dem schwenkbaren Endbereich und dem Basisendbereich des Betätigungshebels (21) angeordnet und welcher schwenkbar mit dem Sperrelement (27) verbunden ist.

17. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 9 bis 16, dadurch gekennzeichnet, daß das Führungselement (30) eine rechteckige Öffnung (38) aufweist, die zwischen dem ersten und zweiten Ende ausgebildet ist, und der untere Stützwinkel (9) umfaßt einen Feder-aufnehmenden Bereich (40), welcher mit dem unteren Federsitz (41) ausgebildet und lose in der rechteckigen Öffnung (38) des Führungselementes (30) aufgenommen ist.

18. Schwenkbare Lenksäulenanordnung nach Anspruch 17, da-durch gekennzeichnet, daß die Zähne des ersten Elementes (12) mit Verzahnung alle gerade und im wesentlichen parallel zur Achse der konischen Öffnung (16) des ersten Elementes (12) mit Verzahnung sind und die Zähne des zweiten Elementes (13) mit Verzahnung alle gerade und im wesentlichen parallel zur Achse der konischen Öffnung (19) des zweiten Elementes (13) mit Verzahnung sind,
daß der Betätigungshebel (21) um eine Hebelachse schwenkbar ist, welche im wesentlichen entlang einer Linie senkrecht zur Achse der unteren Säule (2) verläuft,
daß der Schwenk-Sperrmechanismus (45) ferner eine Sperrfeder (33) aufweist, um die ersten (12) und zweiten (13) Elemente mit Verzahnung in Eingriff ineinander zu halten, wobei die Sperrfeder (33) zwischen dem Sperrelement (27) und dem ersten Element (12) mit Verzahnung angeordnet ist,
und daß das Sperrelement (27) erste und zweite aufrechte Wandbereiche aufweist, welche flach und parallel zueinander sind, sowie einen flachen Bodenbereich, welcher zwischen den ersten und zweiten aufrechten Wandbereichen verläuft und welcher im wesentlichen senkrecht zu den ersten und zweiten aufrechten Wandbereichen ist, wobei die ersten (12) und zweiten (13) Elemente mit Verzahnung zwischen den ersten und zweiten aufrechten Wandbereichen des Sperrelementes (27) angeordnet sind, die geneigten Schlitze (25) des Sperrelementes (27) jeweils in den ersten und zweiten aufrechten Wandbereichen ausgebildet sind, wobei jeder der geneigten Schlitze (25) entlang einer geraden Linie verläuft, welche bezüglich des flachen Bodenbereiches geneigt ist, das erste Element (12) mit Verzahnung mit dem Sperrelement (27) durch den Stift (11) verbunden ist, der in den geneigten Schlitzen (25) derart aufgenommen ist, daß eine geradlinige Bewegung des Sperrelementes (27) eine Schwenkbewegung des ersten Elementes (12) mit Verzahnung bewirkt.

19. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 1 bis 18, dadurch gekennzeichnet, daß die Säulenuntereinheit eine Befestigungshalterung (1) zum Stützen der unteren Säule (2) aufweist, wobei die Befestigungshalterung (1) einen

oberen Bereich, linke und rechte erste Seitenbereiche und linke und rechte untere Bereiche aufweist, welche nach unten unter den oberen Bereich verlaufen, wobei die untere Säule (2) zwischen den linken und rechten unteren Bereichen unter dem oberen Bereich angeordnet sind, die Befestigungshalterungen (1) ein fugenlos einzelnes Metallstück in Form eines geformten Metallblattes ist, und der obere Bereich, die Seitenbereiche und die unteren Bereiche der Befestigungshalterung (1) integrale Bestandteile des einzelnen Metallstückes sind, wobei jeder der linken und rechten Seitenbereiche nach unten vom oberen Bereich verläuft, der linke untere Bereich vom linken Seitenbereich verläuft und der rechte untere Bereich vom rechten Seitenbereich verläuft.

20. Schwenkbare Lenksäulenanordnung nach Anspruch 19, dadurch gekennzeichnet, daß der obere Bereich der Befestigungshalterung (1) linke und rechte flache Endbereiche und einen Mittelbereich aufweist, welcher zwischen den linken und rechten flachen Endbereichen liegt, wobei der linke erste Seitenbereich flach und senkrecht zum linken Endbereich ist und nach unten von einer ersten Seite des linken Endbereiches verläuft, der rechte Seitenbereich flach und senkrecht zum rechten Endbereich ist und nach unten von einer ersten Seite des rechten Endbereiches verläuft, der linke untere Bereich flach und senkrecht zum linken Seitenbereich ist und der rechte untere Bereich flach und senkrecht zum rechten Seitenbereich ist.

21. Schwenkbare Lenksäulenanordnung nach Anspruch 19 oder 20, dadurch gekennzeichnet, daß die Befestigungshalterung (1) einen ersten Rand aufweist, welcher zwischen dem linken Endbereich und dem linken Seitenbereich ausgebildet ist, sowie einen zweiten Rand, welcher zwischen dem rechten Randbereich und dem rechten Seitenbereich ausgebildet ist, einen dritten Randbereich, welcher zwischen dem linken Seitenbereich und dem linken unteren Bereich ausgebildet ist, und einen vierten Rand, welcher zwischen dem rechten Seitenbereich und dem rechten unteren Bereich ausgebildet ist, wobei die ersten und zweiten Ränder entlang einer horizontalen geraden Linie verlaufen und zueinander ausgerichtet sind, und jeder der dritten und vierten Ränder nach unten entlang einer Linie senkrecht zur horizontalen geraden Linie verläuft.

22. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 19 bis 21, dadurch gekennzeichnet, daß die Befestigungshalterung (1) linke und rechte längliche Öffnungen (111) aufweist, welche jeweils in den linken und rechten Endbereichen ausgebildet sind und welche entlang der Achse der unteren Säule (2) verlaufen.

23. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 19 bis 22, dadurch gekennzeichnet, daß die Befestigungshalterung (1) ferner linke und rechte zweite Seitenbereiche aufweist, welche jeweils von zweiten Seiten der linken und rechten Endbereiche nach unten verlaufen, und daß die Befestigungshalterung (1) symmetrisch ist, so daß die Befestigungshalterung (1) durch eine imaginäre Mittelebene in linke und rechte Hälften teilbar ist, von denen jede im wesentlichen ein Spiegelbild der anderen darstellt.

24. Schwenkbare Lenksäulenanordnung nach einem der Ansprüche 19 bis 23, dadurch gekennzeichnet, daß die Befestigungshalterung (1) durch Krümmen einer ursprünglich dünnen Metallplatte ausgebildet wird, welche flach und symmetrisch mit Bezug auf eine Mittellinie ist, und welche einen U-förmigen Ausschnittbereich und einen T-förmigen Ausschnittbereich aufweist, von denen jeder symmetrisch mit Bezug zur Mittellinie ist.

Revendications

1. Dispositif inclinable de colonne de direction comprenant:

un sous-dispositif de colonne comprenant des colonnes supérieure (5) et inférieure (2), reliées entre elles de sorte que ladite colonne supérieure (5) peut basculer autour d'un axe d'inclinaison; et

un mécanisme (45) de verrouillage d'inclinaison pour permettre à ladite colonne supérieure (5) de basculer lorsque ledit mécanisme (45) de verrouillage d'inclinaison est en état déverrouillé, et empêcher que ladite colonne supérieure (5) bascule lorsque ledit mécanisme (45) de verrouillage d'inclinaison est en état verrouillé, ledit mécanisme (45) de verrouillage d'inclinaison comprenant un premier élément denté (12) qui est supporté par ladite colonne supérieure (5), et un deuxième élément denté (13) qui est supporté par ladite colonne inférieure (2), un desdits éléments dentés (12, 13) étant supporté de façon à pouvoir basculer, lesdits premier (12) et deuxième (13) éléments dentés étant enclenchés l'un dans l'autre lorsque ledit mécanisme (45) de verrouillage d'inclinaison est dans ledit état verrouillé et étant libérés l'un de l'autre lorsque ledit mécanisme (45) de verrouillage d'inclinaison est dans ledit état déverrouillé, caractérisé par le fait que les deux éléments dentés (12, 13) sont supportés de façon à pouvoir basculer et ont la forme d'une barre.

2. Dispositif inclinable de colonne de direction selon la revendication 1, caractérisé par le fait que chacun desdits premier (12) et deuxième (13) éléments dentés s'étend sensiblement le long d'un axe de ladite colonne inférieure (2), et comporte des dents qui sont agencées sur un plan sensiblement plat.

3. Dispositif inclinable de colonne de direction selon la revendication 2, caractérisé par le fait que ledit premier élément denté (12) comprend une partie d'extrémité de base qui est supportée en pivotement par ladite colonne supérieure (5), de sorte que ledit premier élément denté (12) peut basculer autour d'un premier axe de basculement, ledit deuxième élément denté (13) comprend une partie d'extrémité de base qui est supportée en pivotement par ladite colonne supérieure (5), de sorte que ledit deuxième élément denté (13) peut basculer sur un deuxième axe de basculement, ledit premier élément denté (12) comprend en outre une partie dentée pouvant basculer (12a) comprenant une face inférieure orientée vers le bas et comportant des dents espacées les unes des autres le long d'une ligne droite, et ledit deuxième élément denté (13) comprend en outre une partie dentée pouvant basculer (13a) qui est située sous ladite partie dentée (12a) dudit premier élément denté (12) et qui comprend une face supérieure orientée vers le haut en direction de ladite face inférieure dudit premier élément denté (12), et ayant des dents qui sont espacées les unes des autres le long d'une ligne droite.

4. Dispositif inclinable de colonne de direction selon l'une des revendications 1 à 3, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre un élément (27) de verrouillage pour libérer lesdites parties dentées desdits premier (12) et deuxième (13) éléments dentés l'un de l'autre quand ledit élément de verrouillage (27) est déplacé dans une première direction parallèle à un axe de ladite colonne inférieure (2) et enclencher lesdites parties dentées (12a, 13a) desdits éléments dentés (12, 13) l'un dans l'autre quand ledit élément (27) de verrouillage est déplacé dans une deuxième de direction opposée à ladite première direction.

5. Dispositif inclinable de colonne de direction selon l'une des revendications 1 à 4, caractérisé par le fait que ledit dispositif inclinable de colonne de direction comprend en outre un ressort (44) d'inclinaison qui est disposé entre lesdites colonnes inférieure (2) et supérieure (5) et qui tend à faire basculer ladite colonne supérieure (5) autour dudit axe d'inclinaison dans une direction vers le haut, et dans lequel ledit mécanisme (45) de verrouillage d'inclinaison et ledit ressort (44) d'inclinaison se trouvent tous les deux sous ledit sous-dispositif de colonne près dudit axe d'inclinaison.

6. Dispositif inclinable de colonne de direction selon la revendication 4 ou 5, caractérisé par le fait que ledit deuxième élément denté (13) est réalisé avec une rainure droite (22) de guidage s'étendant le long d'une ligne droite sensiblement perpendiculaire audit deuxième axe de basculement, ledit élément (27) de verrouillage est réalisé avec une fente inclinée (25) et une saillie (24) vers l'intérieur qui est reçue de façon à pouvoir glisser dans ladite rainure (22) de guidage dudit deuxième élément denté (13), et ledit premier élément denté (12) comprend une saillie (23) vers l'extérieur qui est reçue de façon à pouvoir glisser dans ladite fente inclinée (25) dudit élément (27) de verrouillage.

7. Dispositif inclinable de colonne de direction selon l'une des revendications 1 à 5, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre un élément (30) de guidage ayant une première extrémité supportée en pivotement par ladite colonne supérieure (5), et une deuxième extrémité qui est réalisée avec un trou oblong (37) et qui est reliée à travers ledit trou oblong (37) à ladite colonne inférieure (2) de sorte que ledit élément (30) de guidage peut être déplacé le long d'un axe de ladite colonne inférieure (2).

8. Dispositif inclinable de colonne de direction selon la revendication 7, caractérisé par le fait que ledit ressort (44) d'inclinaison est disposé en compression entre ladite colonne inférieure (2) et ledit élément (30) de guidage.

9. Dispositif inclinable de colonne de direction selon la revendication 7 ou 8, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre une bride inférieure (9) de fixation qui est fixée à ladite colonne inférieure (2), et ledit ressort (44) d'inclinaison est un ressort en spirale et est disposé entre un siège (41) de ressort inférieur, réalisé dans ladite bride inférieure (9) de fixation, et un siège (43) de ressort supérieur réalisé dans ledit élément (30) de guidage, lesdits sièges de ressort inférieur (41) et supérieur (43) de ladite bride inférieure (9) de fixation et dudit élément (30) de guidage étant agencés sensiblement sur une ligne droite parallèle audit axe de ladite colonne inférieure (2) de sorte qu'un axe dudit ressort (44) d'inclinaison est maintenu sensiblement en parallèle audit axe de ladite colonne inférieure (2).

10. Dispositif inclinable de colonne de direction selon l'une des revendications 4 à 9, caractérisé par le fait que ledit deuxième élément denté (13) comporte des rainures droites (22) de guidage gauche et droite qui s'étendent le long d'une ligne droite sensiblement perpendiculaire audit deuxième axe de basculement, ledit élément (27) de verrouillage comporte des fentes inclinées gauche et droite (25) et des saillies gauche et droite (24) vers l'intérieur qui sont reçues dans lesdites rainures (22) de guidage dudit deuxième élément denté (13) de façon à pouvoir y glisser, et ledit premier élément denté (12) comprend des saillies (23) vers l'extérieur qui sont reçues dans lesdites fentes inclinées (25) dudit élé-

ment (27) de verrouillage de façon à pouvoir y glisser.

11. Dispositif inclinable de colonne de direction selon l'une des revendications 3 à 10, caractérisé par le fait que ladite partie d'extrémité de base d'un desdits premier (12) et deuxième (13) éléments dentés comporte un trou conique (16, 19) ayant une surface intérieure qui est la surface incurvée d'un cône tronqué, et supportée en pivotement par l'intermédiaire d'un collier (15, 18) en forme de barrillet qui est confiné dans ledit trou conique (16, 19).

12. Dispositif inclinable de colonne de direction selon l'une des revendications 3 à 10, caractérisé par le fait que ledit premier élément denté (12) comprend un axe (23) de guidage et un trou conique (16) réalisé dans ladite partie d'extrémité de base dudit premier élément denté (12), et ledit deuxième élément denté (13) comprend un trou conique (19), ledit trou conique (16, 19) de chacun desdits premier (12) et deuxième (13) éléments dentés ayant une surface intérieure qui est la surface incurvée d'un cône circulaire droit tronqué, et

par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre un premier collier (15) en forme de barrillet reçu dans ledit trou conique (16) dudit premier élément denté (12), et un deuxième collier (18) en forme de barrillet reçu dans ledit trou conique (19) dudit deuxième élément denté (13), ledit premier élément denté (12) étant supporté de façon pivotante par ledit premier collier (15) en forme de barrillet sur ladite colonne supérieure (5), ledit deuxième élément denté (13) étant supporté de façon pivotante par ledit deuxième collier (18) en forme de barrillet sur ladite colonne inférieure (2).

13. Dispositif inclinable de colonne de direction selon l'une des revendications 9 à 12, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre une bride supérieure (10) de fixation qui est fixée sur une face inférieure de ladite colonne supérieure (5), et qui comprend des premier et deuxième bras entre lesquels est placée ladite partie d'extrémité de base dudit premier élément denté (12), ladite bride inférieure (9) de fixation étant fixée sur une face inférieure de ladite colonne inférieure (2) et comprenant des premier et deuxième bras entre lesquels est placée ladite partie d'extrémité de base dudit deuxième élément denté (13), et

par le fait que ledit premier élément denté (12) est supporté de façon pivotante par un premier boulon (11) qui est inséré à travers un perçage central réalisé dans ledit premier collier (15) en forme de barrillet et à travers ledit trou conique (16) dudit premier élément denté (12) et qui est supporté par lesdits premier et deuxième bras de ladite bride supérieure (10) de fixation, et ledit deuxième élément denté (13) est supporté de façon pivotante par un deuxième boulon (14) qui est inséré à travers un alésage central réalisé dans ledit deuxième collier (18) en forme de barrillet et à travers ledit trou conique dudit deuxième élément denté (13), et qui est supporté par lesdits premier et deuxième bras de ladite bride inférieure (9) de fixation.

14. Dispositif inclinable de colonne de direction selon la revendication 13, caractérisé par le fait que ledit deuxième boulon (14) est inséré à travers ledit trou oblong (37) dudit élément (30) de guidage, et ledit premier bouton (11) est inséré à travers un trou dans ladite première extrémité dudit élément (30) de guidage de sorte qu'un axe dudit premier bouton (11) est maintenu sensiblement stationnaire par rapport audit élément (30) de guidage.

15. Dispositif inclinable de colonne de direction selon la revendication 14, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre une première rondelle ondulée (17) pour pousser l'un desdits premier collier (15) en forme de barrillet et premier élément denté (12) contre l'autre, et une deuxième rondelle ondulée (20) pour pousser l'un desdits deuxième collier (18) en forme de barrillet et deuxième élément denté (13) contre l'autre, ladite première rondelle ondulée (17) étant montée sur ledit premier boulon (11) entre lesdits premier et deuxième bras de ladite bride supérieure (10) de fixation, et ladite deuxième rondelle ondulée (20) étant montée sur ledit deuxième bouton (14) entre lesdits premier et deuxième bras de ladite bride inférieure (9) de fixation.

16. Dispositif inclinable de colonne de direction selon l'une des revendications 7 à 15, caractérisé par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre un levier (21) de commande comprenant une partie d'extrémité pouvant basculer, une partie d'extrémité de base supportée en pivotement par ladite première extrémité dudit élément (30) de guidage, et une partie intermédiaire qui est située entre ladite partie d'extrémité pouvant basculer et ladite partie d'extrémité de base dudit levier (21) de commande et qui est reliée en pivotement audit élément (27) de verrouillage.

17. Dispositif inclinable de colonne de direction selon l'une des revendications 9 à 16, caractérisé par le fait que ledit élément (30) de guidage comprend un trou rectangulaire (38) réalisé entre lesdites première et deuxième extrémités, et ladite bride inférieure (9) de fixation comprend une partie (40) recevant un ressort qui est réalisée avec ledit siège (41) de ressort inférieur, et qui est reçue librement dans ledit trou rectangulaire (38) dudit élément (30) de guidage.

18. Dispositif inclinable de colonne de direction selon la revendication 17, caractérisé par le fait que lesdites dents dudit élément denté (12) sont toutes droites et sensiblement parallèles audit axe dudit trou conique (16) dudit premier élément denté (12), et lesdites dents dudit deuxième élément denté (13) sont toutes droites et sensiblement parallèles audit axe dudit trou conique (19) dudit deuxième élément denté (13),

par le fait que ledit levier (21) de commande peut basculer autour d'un axe de levier qui s'étend sensiblement le long d'une ligne perpendiculaire audit axe de ladite colonne inférieure (2),

par le fait que ledit mécanisme (45) de verrouillage d'inclinaison comprend en outre un ressort (33) de verrouillage pour maintenir lesdits premier (12) et deuxième (13) éléments dentés enclenchés l'un dans l'autre, ledit ressort (33) de verrouillage étant disposé entre ledit élément (27) de verrouillage et ledit premier élément denté (12),

et par le fait que ledit élément (27) de verrouillage comprend des première et deuxième parties de paroi verticales, qui sont plates et parallèles l'une à l'autre, et une partie inférieure plate, qui s'étend entre lesdites première et deuxième parties de paroi verticales et qui est sensiblement perpendiculaire auxdites première et deuxième parties de paroi verticales, lesdits premier (12) et deuxième (13) éléments dentés étant placés entre lesdites première et deuxième parties de paroi verticales dudit élément (27) de verrouillage, lesdites fentes inclinées (25) dudit élément (27) de verrouillage étant réalisées, respectivement, dans lesdites première et deuxième parties de paroi verticales, chacune desdites fentes inclinées (25) s'étendant le long d'une ligne droite qui est inclinée par rapport à ladite partie inférieure plate, ledit premier élément denté (12) étant relié audit élément (27) de verrouillage par l'intermédiaire dudit axe (11) reçu dans lesdites fentes inclinées (25) de sorte qu'un mouvement rectiligne dudit élément (27) de verrouillage provoque un mouvement de basculement dudit premier élément denté (12).

19. Dispositif inclinable de colonne de direction selon l'une des revendications 1 à 18, caractérisé par le fait que ledit sous-dispositif de colonne comprend une bride (1) de montage pour supporter ladite colonne inférieure (2), ladite bride (1) de montage comprenant une partie supérieure, des premières parties latérales gauche et droite et des parties inférieures gauche et droite qui s'étendent vers le bas sous ladite partie supérieure, ladite colonne inférieure (2) étant disposée entre lesdites parties inférieures gauche et droite sous ladite partie supérieure, ladite bride (1) de montage étant une pièce métallique unique sans joint ayant la forme d'une feuille de métal formée, et lesdites partie supérieure, parties latérales et parties inférieures de ladite bride (1) de montage étant toutes parties intégrantes de ladite pièce métallique unique, chacun desdites parties latérales gauche et droite s'étendant vers le bas à partir de ladite partie supérieure, ladite partie inférieure gauche s'étendant à partir de ladite partie latérale gauche, et ladite partie inférieure droite s'étendant à partir de ladite partie latérale droite.

20. Dispositif inclinable de colonne de direction selon la revendication 19, caractérisé par le fait que ladite partie supérieure de ladite bride (1) de montage comprend des parties d'extrémité plates gauche et droite et une partie médiane située entre lesdites parties d'extrémité plates gauche et droite, ladite première partie latérale gauche étant plate et perpendiculaire à ladite partie d'extrémité gauche et s'étendant vers le bas à partir d'un premier côté de ladite partie d'extrémité gauche, ladite partie latérale droite étant plate et perpendiculaire à ladite partie d'extrémité droite et s'étendant vers le bas à partir d'un premier côté de ladite partie d'extrémité droite, ladite partie inférieure gauche étant plate et perpendiculaire à ladite partie latérale gauche, ladite partie inférieure droite étant plate et perpendiculaire à ladite partie latérale droite.

21. Dispositif inclinable de colonne de direction selon la revendication 19 ou 20, caractérisé par le fait que ladite bride (1) de montage comprend un premier bord réalisé entre ladite partie d'extrémité gauche et ladite partie latérale gauche, un deuxième bord réalisé entre ladite partie d'extrémité droite et ladite partie latérale droite, un troisième bord réalisé entre ladite partie latérale gauche et ladite partie inférieure gauche et un quatrième bord réalisé entre ladite partie latérale droite et ladite partie inférieure droite, lesdits premier et deuxième bords s'étendant le long d'une ligne droite horizontale et étant alignés, chacun desdits troisième et quatrième bords s'étendant vers le bas le long d'une ligne perpendiculaire à ladite ligne droite horizontale.

22. Dispositif inclinable de colonne de direction selon l'une des revendications 19, 21, caractérisé par le fait que ladite bride (1) de montage comprend des trous oblongs (111) gauche et droit qui sont réalisés, respectivement, dans lesdites parties d'extrémité gauche et droite et qui s'étendent le long dudit axe de ladite colonne inférieure (2).

23. Dispositif inclinable de colonne de direction selon l'une des revendications 19, 22, caractérisé par le fait que ladite bride (1) de montage comprend en outre des deuxièmes parties latérales gauche et droite s'étendant vers le bas, respectivement, à partir des deuxièmes côtés desdites parties d'extrémité gauche et droite, et par le fait que ladite bride (1) de montage est symétrique de sorte qu

ladite bride (1) de montage peut être divisée par un plan médian imaginaire en moitiés gauche et droite, dont chacune est sensiblement une image en miroir de l'autre.

24. Dispositif inclinable de colonne de direction selon l'une des revendications 19 à 23, caractérisé par le fait que ladite bride (1) de montage est réalisée en pliant une fine plaque de métal de départ, qui est plate et symétrique par rapport à une ligne centrale, et qui comprend une partie découpée en forme de U et une partie découpée en forme de T, dont chacune est symétrique par rapport à ladite ligne centrale.

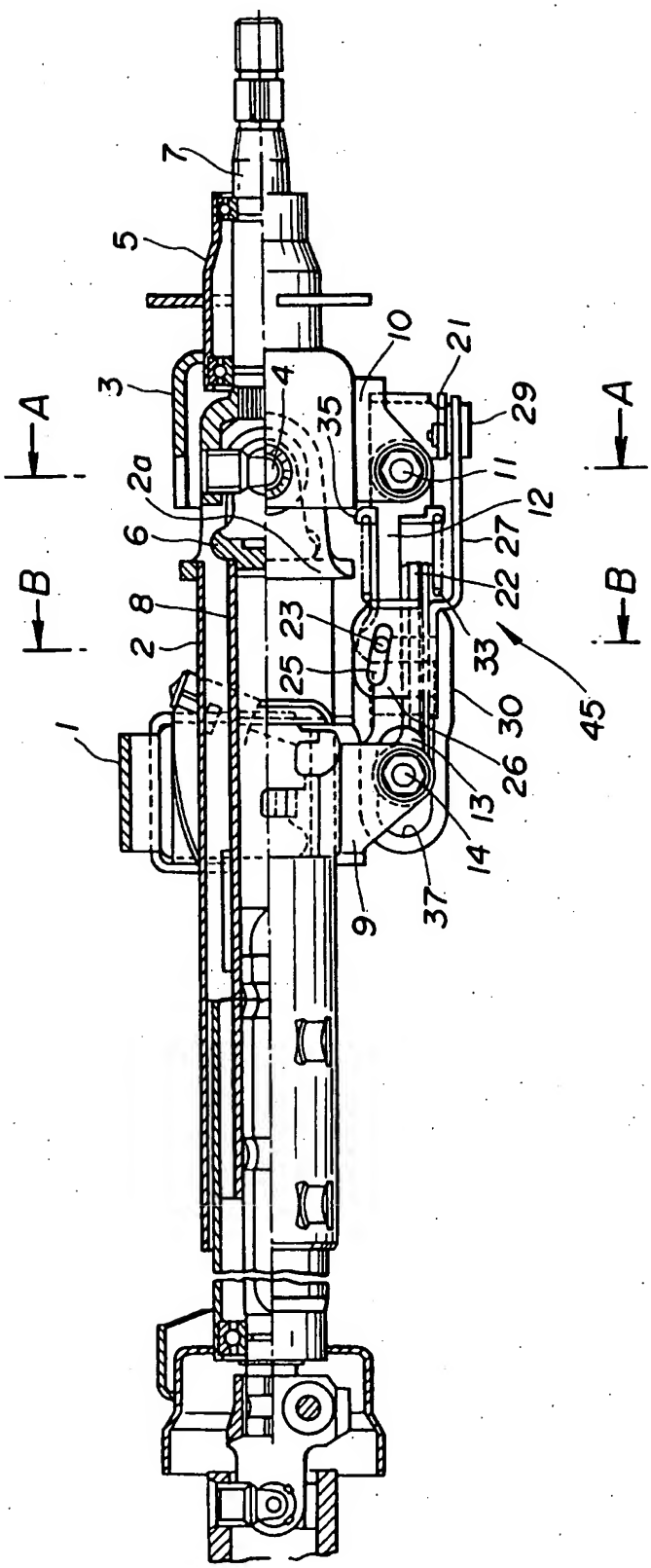
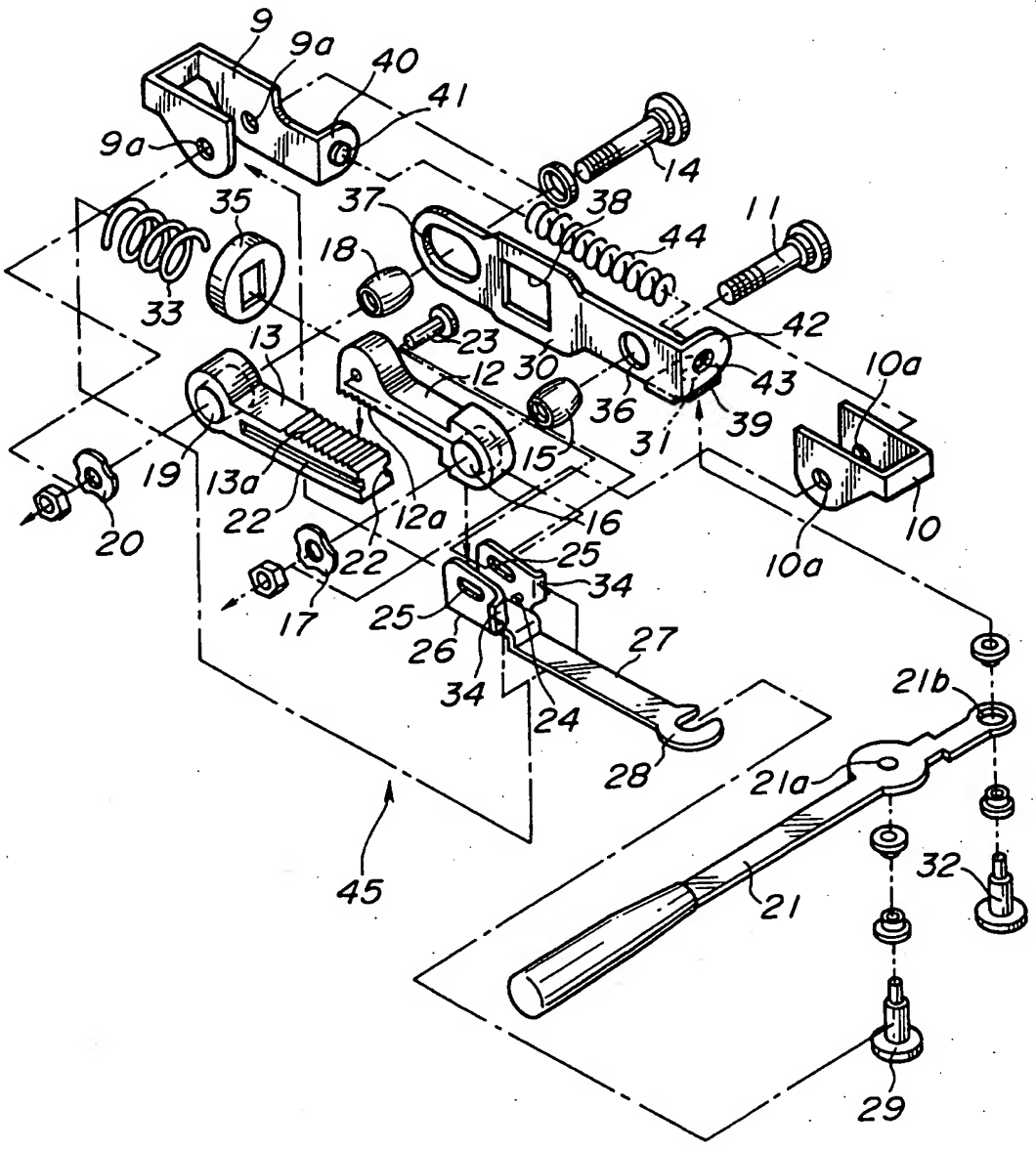


FIG.1

FIG.2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43
10a
36
39
31
19
13a
15
22
12a
16
10
20
22
10a
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34
17
25
26
27
34
24
21b
28
21a
45
32
21
29

FIG. 3

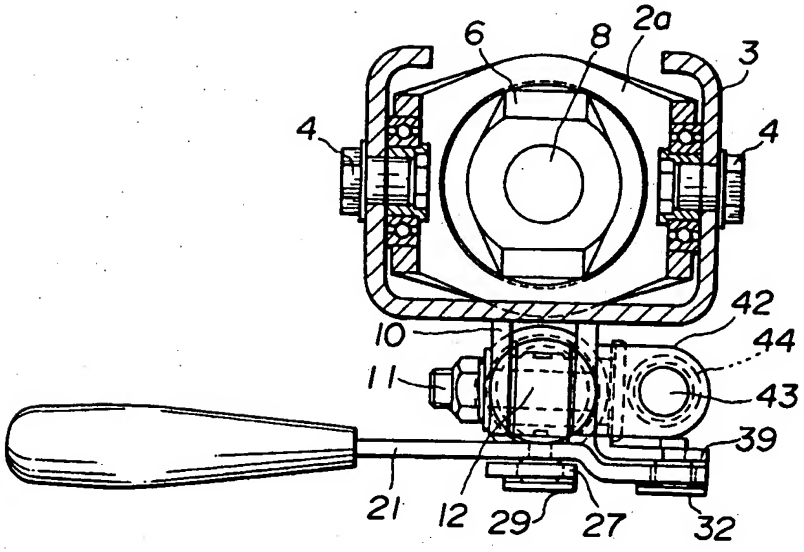


FIG. 4

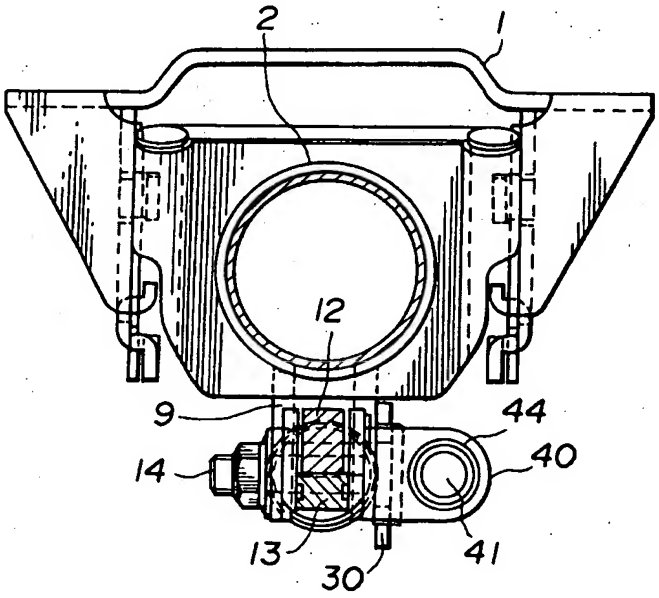


FIG.5

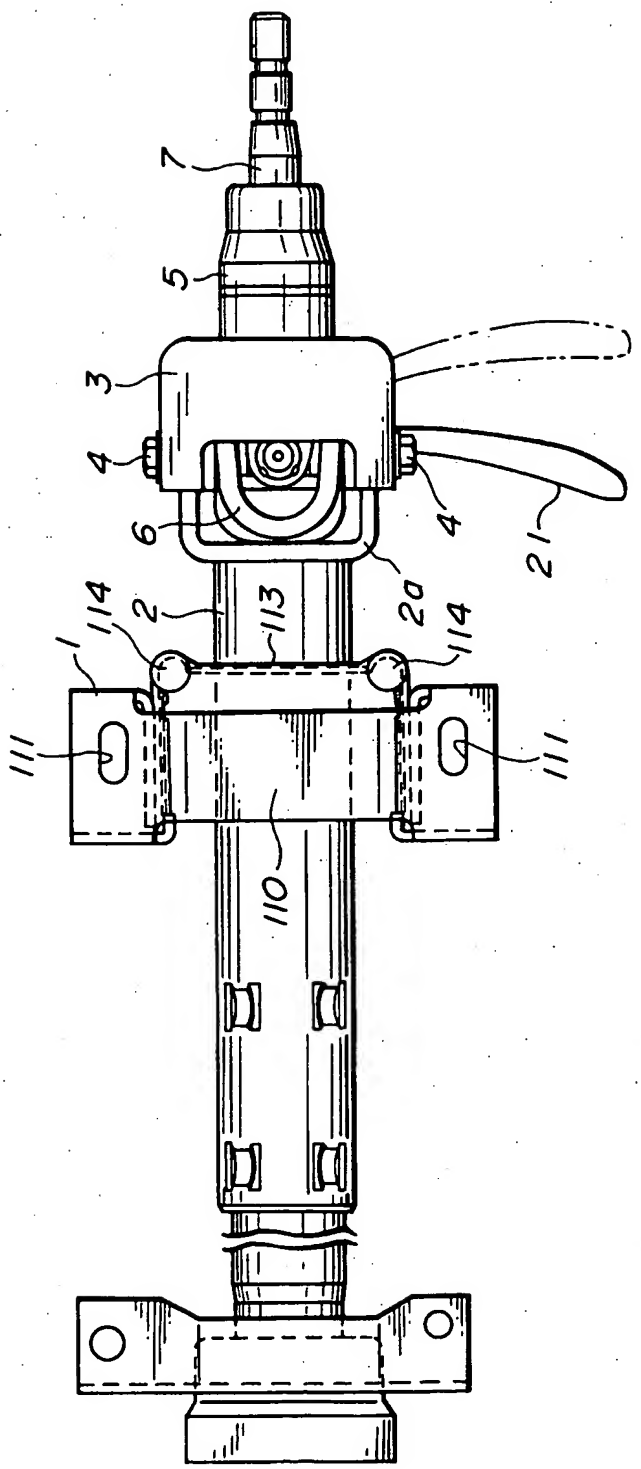
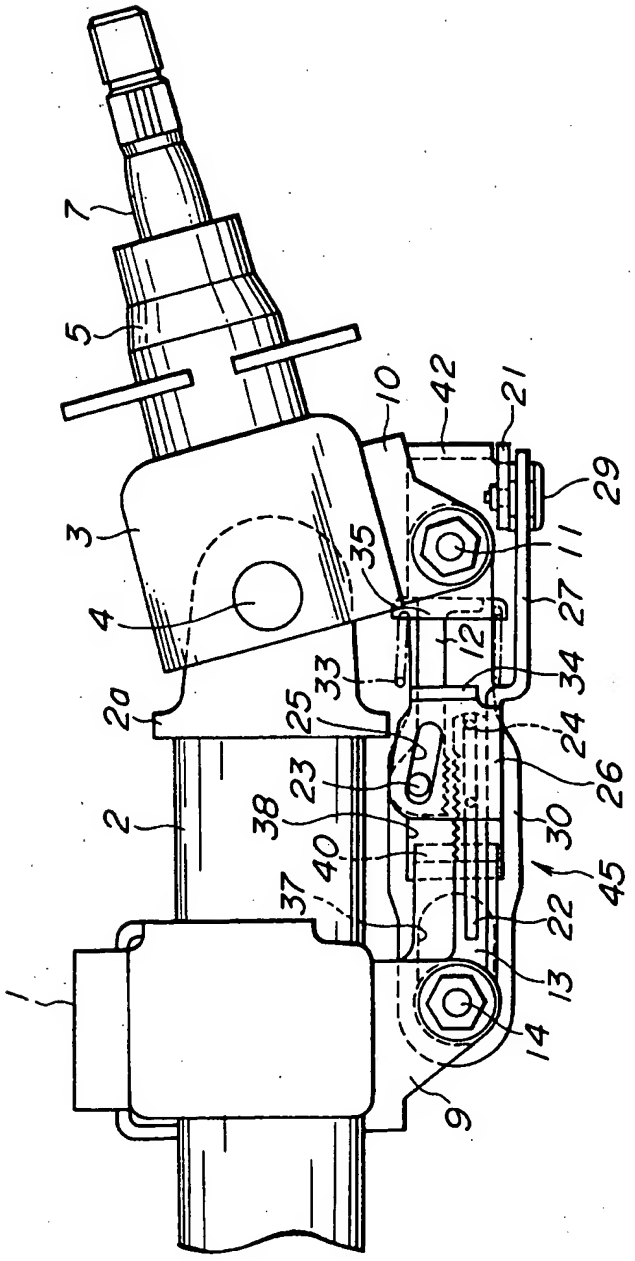


FIG.6


7
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42
21
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3
35
11
4
27
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23
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2
38
30
40
45
37
22
1
13
14
9

FIG. 7

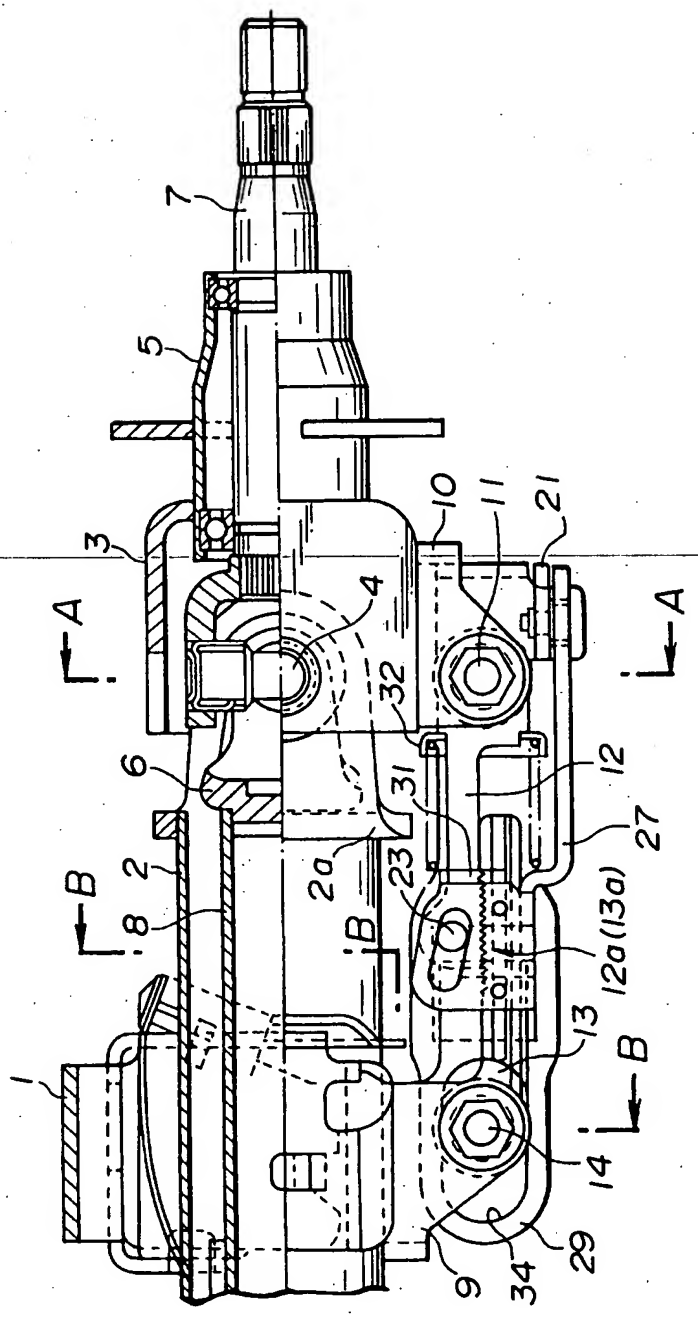


FIG. 8

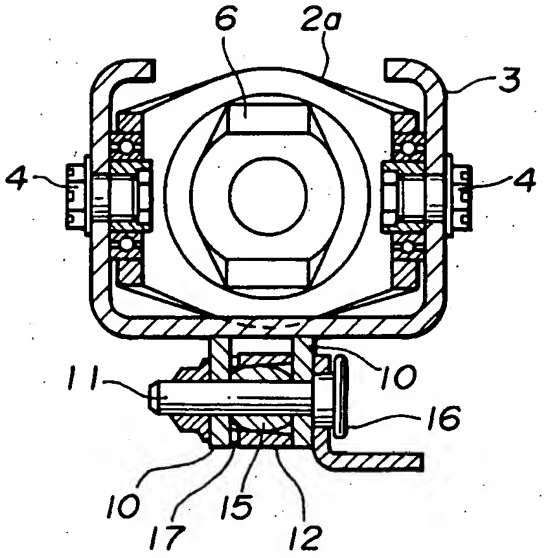


FIG. 9

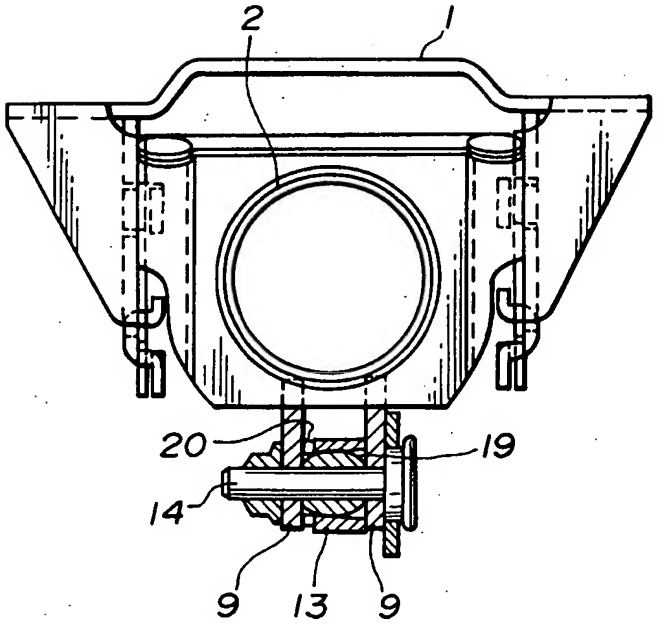


FIG.10

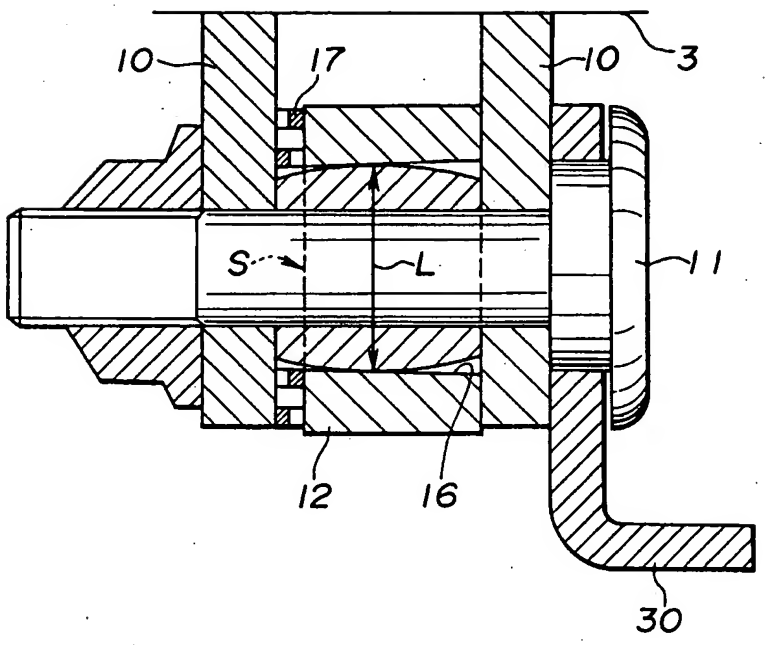
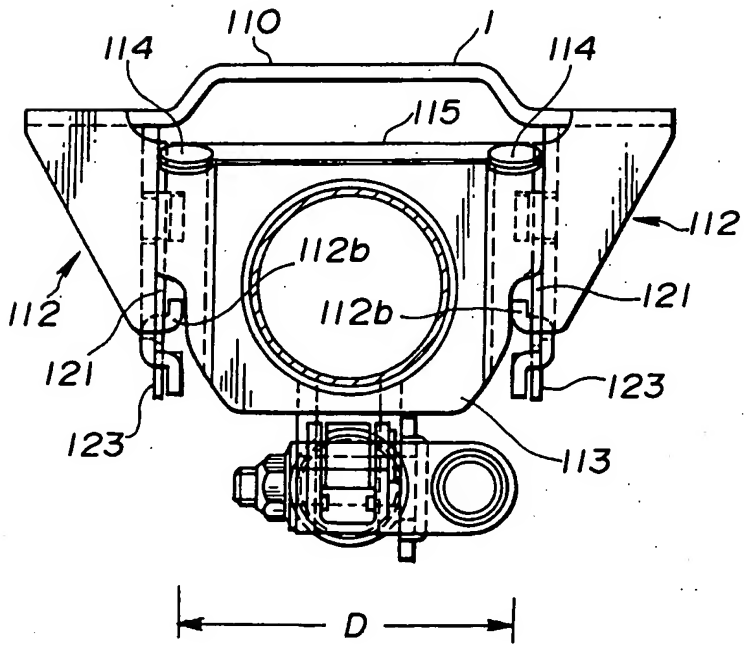

10
17
10
3
S
L
11
12
16
30

FIG.11


110
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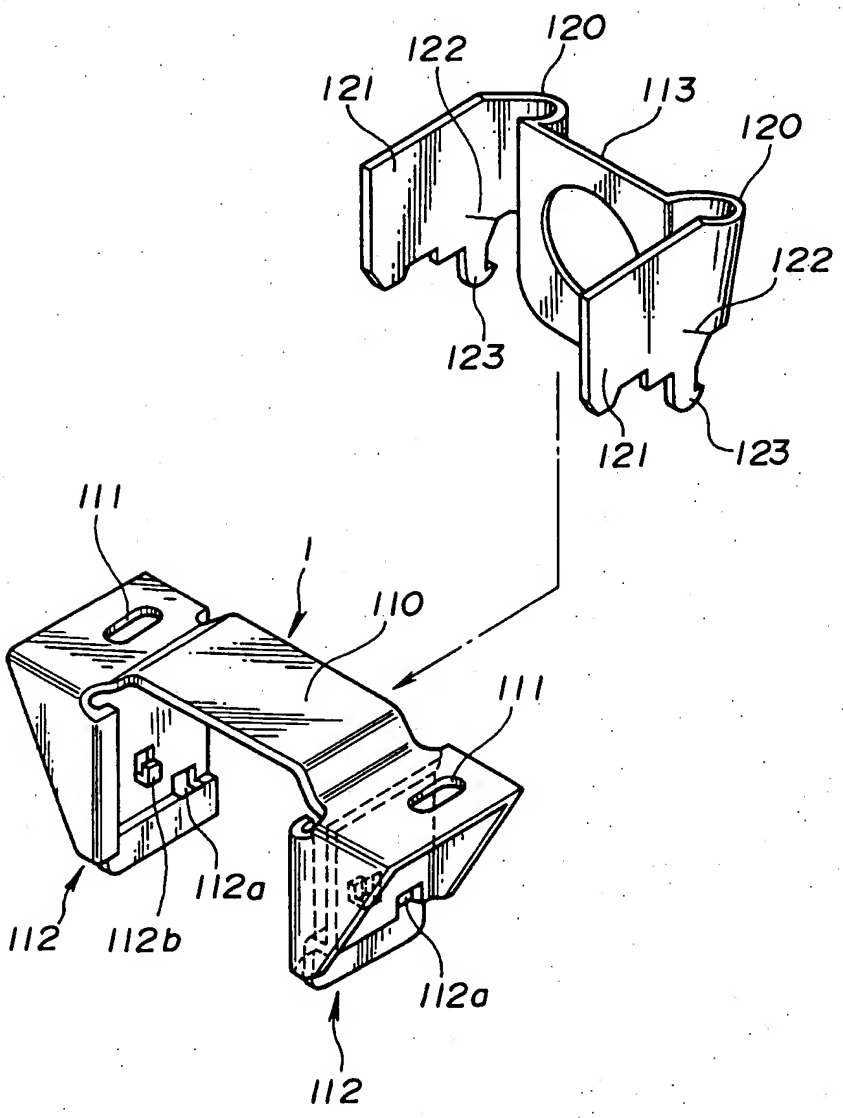
114
114
115
112
112b
112
112b
121
121
123
123
113
D

FIG.12


120
122
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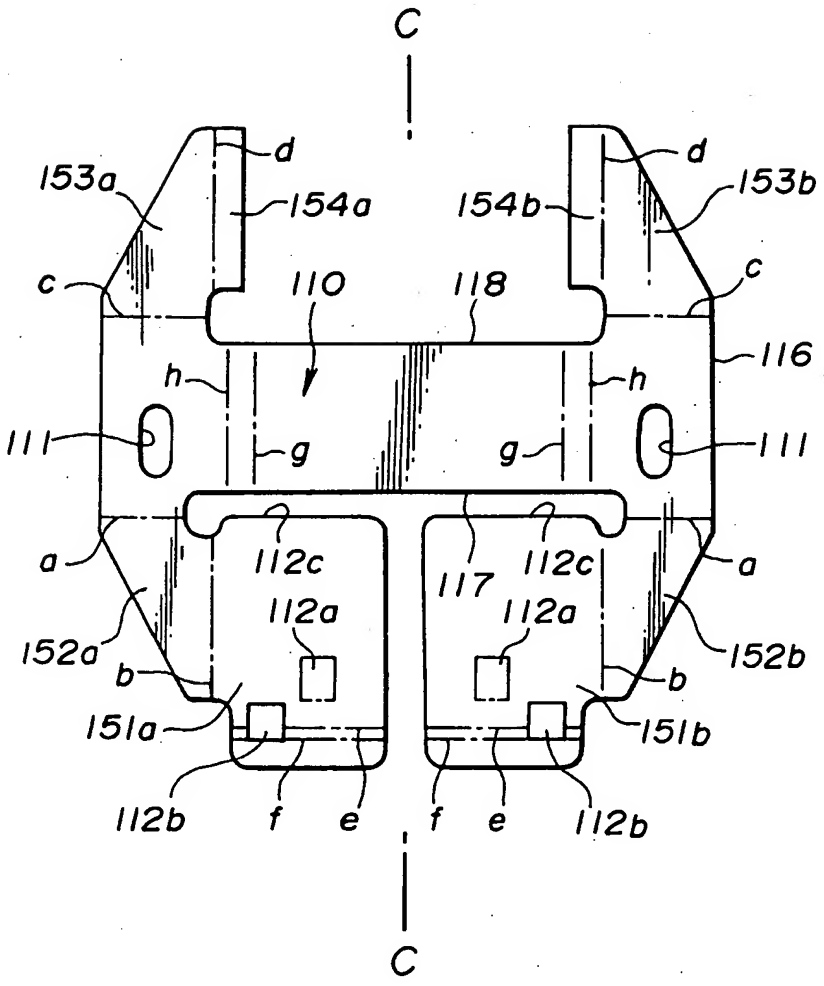
113
120
122
123
121
123
111
1
110
111
112a
112
112b
112a
112

FIG.13


C
d
153a
154a
154b
153b
c
110
118
116
h
111
g
112c
117
112a
a
152a
b
151a
112b
f
e
152b
151b
C